AGGREGATE RESOURCES IN THE RURAL MUNICIPALITY OF GLENWOOD

RESOURCE MANAGEMENT AND PIT REHABILITATION PROPOSAL FOR LAND USE PLANNING

DEPARTMENT OF ENERGY AND MINES
MINERAL RESOURCES DIVISION

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ABSTRACT

Aggregate resources are an essential mineral commodity required for present and future construction activities in Manitoba. This non-renewable resource, under present engineering technology, has no suitable substitute for most end uses. Aggregates are characterized by a low intrinsic value, a high bulk, and a delivered price that is highly sensitive to transportation costs. The economics of production dictate that mineral extraction and processing be located as close to the construction project as economically feasible. In light of the general scarcity of local high quality aggregate material, safeguards are needed to conserve the existing supply.

This resource management proposal has been compiled in order to promote aggregate resource conservation as well as to facilitate regional land use planning activities in the R.M. of Glenwood. The report contains background information concerning aggregate potential within the planning district.

The aggregate resource base of the R.M. of Glenwood is located in Quaternary outwash and terrace deposits. A total of five aggregate deposits were identified containing an estimated 1 869 575 cubic yards of material of which three deposits containing an estimated 1 732 800 have been designated for a Stop Development Status. It is recommended that all deposits assigned a Stop Development Status be protected from conflicting surface land use until the resource has been mined to depletion.

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SECTION 1

INTRODUCTION

1.1 GENERAL STATEMENT

Aggregate resources (sand, gravel and crushed bedrock) are an essential mineral commodity required for present and future construction activities in Manitoba. This resource, under present engineering technology, has no suitable substitute for most end uses. Typical construction end uses for aggregate include engineering projects such as highway construction and maintenance, hospitals, homes, educational facilities etc. (see Table 1). Aggregate is characterized as a high bulk, low unit value mineral commodity that replaces more expensive construction materials. The restricted supply of regional aggregate resources due to resource scarcity, depletion, or sterilization can act as an economic constraint on present and future construction requirements. The problem of limited resource availability is compounded by increased development pressure around urban centres and expanding aggregate requirements to support construction requirements of a growing economy and population.

The primary objective of this resource management proposal is to provide technical input concerning sand and gravel resources conservation as a component in the Souris/Glenwood Planning District Development Plan. The management of sand and gravel resources, based upon Provincial Land Use Policy #13, is important to ensure that a supply of aggregate is available to meet the required needs of the construction industry both present and future. The information and resource planning recommendations contained herein will serve as a guide to formulating policies in the development plan concerning aggregate resource management and surface mining as a land user.

1.2 OBJECTIVES

The objectives of this aggregate resource management proposal are:

(1) To provide a comprehensive resource inventory of aggregate deposits located within the Souris/Glenwood Planning District.

(2) To provide a general economic analysis of the regional supply and demand conditions over a 25 year planning horizon.

(3) To outline the significance of aggregate resource conservation to Municipal Councils, Local District Planning Boards, regional land use planners, industry and the public.

(4) To provide statutory requirements under The Mines Act concerning mineral dispositions and rehabilitation requirements of depleted pits.

(5) To provide aggregate resource planning recommendations based upon Provincial Land Use Policy #13, Manitoba Regulation 217/80 of the Planning Act.

1.3 SIGNIFICANCE OF AGGREGATE RESOURCE MANAGEMENT

The aggregate industry is concerned with the removal of naturally occurring materials from beneath the earth's surface and normally includes some form of processing required in order to meet the engineering specification of the end use. The construction aggregate industry is, by volume produced, the largest of the surface mining industries in Manitoba today. The common mineral aggregate (sand, gravel and crushed rock) consist of relatively inert fragments, and their primary function as a construction material is to provide for bulk; consequently, aggregates should be relatively abundant and cheap. For example, aggregates occupy between 70 to 80 per cent of the volume of concrete and the quality of local aggregate deposits can significantly effect the quality of local concrete materials.

Aggregate is characterized by a low intrinsic value, high bulk, and delivered price that is highly sensitive to transportation costs. The market characteristics of the resource dictate that mineral extraction and processing be located as close to the construction site as economically feasible. Construction economics and engineering technology dictate that the resource must be readily available in large quantities of high quality (chemically and physically durable) variably graded, and be delivered at a relatively cheap price. The delivered price is highly sensitive to transportation costs, and by sterilizing aggregate deposits prior to depletion can add significant increased local construction costs due to increased haulage distances required.

Society faces, at the present time, increasing population levels and expanding economic growth rates which require, in the long run, significant volumes of quality aggregate material. To provide the present and future generations with homes, transportation facilities, educational institutions and employment opportunities, society must build and maintain increasing numbers of physical facilities. As aggregate demand is highly inelastic and tied closely to activity in the construction sector, the long-term demand for aggregate is anticipated to at least grow at the same rate as population growth; however, over time, if economic activity increases coupled with the fact that roads and buildings will need replacing, projections of future aggregate requirements may increase significantly greater than population growth rates. Because aggregate is a non-renewable resource one important resource management problem facing the construction industry is the depletion of high quality deposits over time.

Aggregates are given a quality classification dependent upon their chemical and physical durability required for a specific end use. In order for a pit or quarry to supply the required material for a construction project it must be of suitable quality defined by the end use engineering specification. For example, Manitoba Department of Highways requires engineering specifications that a gravel resource must comply with in order to be utilized for asphalt, base course or surfacing gravel.

In general terms the aggregates are produced at the pit or quarry (supply point) and transported to the construction site (demand point) where they are utilized for construction of buildings, roads, bridges, and other engineering projects. The delivered price per tonne reflects the cost of the material, processing, transportation costs, fixed costs of amortizing and reclamation. In certain instances unprocessed material (pit run) is sold and used for fill or sub-base material.

Sand, gravel and crushed stone can be used interchangeably when their quality and delivered price are comparable. Sand and gravel is produced from open pits located in a gravel deposit and processing normally consists of washing, screening and crushing to various sizes and stockpiling. Crushed stone, however, is produced from open quarries in the bedrock and processing includes drilling, blasting, crushing, screening, washing, and stockpiling. Crushed stone is generally more expensive to produce than sand and gravel due to the increased processing and handling required.

TABLE 1.1
Sand and Gravel End Uses in Manitoba

Construction Type	End Use
Road Construction	subbase base traffic (surface) gravel shoulders culvert fill maintenance (pit run) ice control
Concrete Aggregate	road surface dams foundations building ready-mix sidewalks pre-cast blocks, tiles mortar grout
Ashpalt Aggregate	road surfacing parking lots
Railway Construction	subbase ballast
Fill	sewer and water pipe bedding septic field construction rip-rap dam construction

SECTION 2.0

AGGREGATE RESOURCES IN THE RURAL MUNICIPAITY OF GLENWOOD

2.1 INTRODUCTION

The objective of Section 2 is to provide detailed background information in order to develop a resource management policy concerning aggregate mineral extraction for the Rural Municipality of Glenwood District Development Plan. The aggregate resource planning recommendations provided based upon Provincial Land Use Policy #13, reflect the general nature of the supply and demand relationship over a projected 25 year planning horizon. Specific resource topics include general information on the market characteristics of aggregate, end use requirements, aggregate bearing deposits, and resource planning recommendations.

2.2 AGGREGATE RESOURCE POTENTIAL IN THE RURAL MUNICIPALITY OF GLENWOOD

The sand and gravel resources in the Rural Municipality of Glenwood are shown on the Map in the pocket. The resource information concerning sand and gravel is based on a geological consulting report prepared by Underwood, McLellan and Associates Limited prepared for the Mineral Resources Division. A total of 5 deposits were identified (Deposits 010084, 010086, 010087, 010088 and 010089). The total resource potential was estimated to be 1 869 575 cubic metres.

The majority of the aggregate potential in the R.M. of Glenwood is located in Deposit 010087. This deposit contains an estimated 954 000 cubic metres of medium-high quality aggregate and has been utilized extensively for regional aggregate requirements. Other significant sand and gravel deposits are 010086 and 010088. These deposits contain an estimated 536 550 and 242 250 of moderate quality aggregate, and offer much of the remaining future mining potential within the planning district. The remaining deposits possess limited mining potential.

2.3 DEMAND FOR SAND AND GRAVEL

The demand for sand and gravel is tied closely to activity in the construction sector. This type of a relationship between an input and output of a final product is referred to as derived demand where the sand and gravel is produced to meet the required needs of the construction industry. Most of the aggregate consumed in rural areas is for public sector highway and road construction activities. The demand of extraction rate is a function of end use requirements and is directly related to both the level and mix of regional construction-related activities.

The long term demand for sand and gravel is highly inelastic primarily because there is no engineering substitute for most end uses. The long-term implications of a resource that possesses poor technical substitution with a demand relationship that is highly inelastic imply that future requirements for roads and other engineering projects will cost more to build. The increase cost of production generally tends to be absorbed by the consumer of the product rather than the producer. The long term cumulative demand for aggregate is anticipated to grow due to the maintenance requirements of existing structures as well as to supply the essential ingredients in new forms of social and private capital.

Aggregate is a large volume, high-bulk, low-value construction material that substitutes for other more expensive materials such as wood, steel, plastic, etc. One significant resource management concept is the relationshp between quality, quantity demanded, and delivered price. As high quality deposits are depleted or sterilized lower quality deposits will become significantly more valuable.

The estimated demand for aggregate is based on consideration of:

(1) Department of Highways upgrading and improvements for the next 25 years in the R.M. of Glenwood;
(2) municipal requirements both R.M. of Glenwood and Town of Souris; and
(3) requirements for redi-mix concrete and other private interests.

TABLE 2.1

ESTIMATED ANNUAL DEMAND FOR SAND AND GRAVEL
IN THE RURAL MUNICIPALITY OF GLENWOOD

tons

End User	1 Year	25 Years
Department of Highways	8 028	200 700
R.M. of Glenwood/Town of Souris	22 5000	562 500
Private	10 000	250 000
	40 528	1 013 200

The demand for sand and gravel in the R.M. of Glenwood has been estimated to be 1 013 200 for the next 25 year planning period. Local consumption of aggregates include municipal road maintenance, septic field construction, sewer pipe bedding, foundations, and sidwalks. Highway improvements include Provincial Trunk Highways and Provincial Roads.

2.4 RECOMMENDED DEVELOPMENT STATUS OF MINERAL RESOURCE AREAS

The sand and gravel deposits are shown on the map in the pocket. The resource information utilized in the background study is based on geologic mapping by Underwood, McLellan and Associates in 1977. A total of five deposits were identified containing an estimated 1 869 575 cubic metres of aggregate.

The following recommendations for protection of sand and gravel deposits in the R.M. of Glenwood are designed to ensure that a supply of aggregate is available for future use. Land-use planning should recognize the potential for conflict between mineral extraction and other surface land uses (see Appendix II). Surface land uses which restrict or prohibit development of the gravel resources should not be permitted. In order to outline gravel deposits, where conflicting surface land uses should be restricted, the Stop-Caution-Go development status is presented on the map in the pocket and Table 2.2.

This recommended deposit status is based on:

(1) size and quality of the deposit;
(2) present and past use of the resource;
(3) location (in relation to access, transportation routes, and existing land holdings);
(4) the objectives for pit and quarry operation and rehabilitation;
(5) the overall requirements for supply and demand for aggregates; and
(6) local development pressure.

In a manner consistent with Provincial Land Use Policy #13, the Stop development status indicates a valuable deposit upon which no conflicting surface land uses should be permitted. Conflicting surface land-uses include housing (subdivision of lots for residential use), or the imposition of highways or utility corridors over the deposit. Such development should be deferred until the resource is mined to depletion and the site rehabilitated. The Caution development status denotes a deposit whose full potential is not proven, or where quality is not high, but has been recognized as potentially valuable to a region. When conflicting surface land uses occur on deposits assigned a Caution development status the issue should be forwarded to the Mines Branch for comment. Deposits that are depleted or of low quality are assigned a Go development status. These deposits are not important in terms of future resource extraction, and conflicting surface uses may be designated.

TABLE 2.2
RECOMMENDED DEVELOPMENT STATUS OF SAND AND GRAVEL DEPOSITS IN THE SOURIS GLENWOOD PLANNING DISTRICT

Deposit #	Generalized Quality	Reserves	Recommended Development Status	Comments
010084	Medium-low	86 775	CAUTION	outwash terrace
010086	Medium	536 550	STOP	outwash terrace
010087	Medium-high	954 000	STOP	outwash terrace Souris agate pit
010088	Medium	242 250	STOP	
010089	Medium-low	50 000	CAUTION	outwash terrace
		1 869 575		

2.5 CONCLUSION

An estimated total of 1 869 575 cubic metres of aggregate have been identified in the Rural Municipality of Glenwood. This resource will be required in order to meet the required needs of the local construction industry. It is recommended that all deposits assigned a Stop development status be protected from conflicting surface land uses until the resource has been mined to depletion.

REFERENCES

Manitoba Highways, 1982. Material Inventory and Analysis of Sand and Gravel Deposits, Block Files No. 14, 15.

Underwood, McLellan and Associates, 1977. Sand and Gravel Resources of the Brandon Region. Report prepared for Manitoba Department of Mines, Resources and Environmental Management.

APPENDIX I

MANITOBA REGULATION 217/80 OF THE PLANNING ACT PROVINCIAL LAND USE POLICY #13

APPENDIX II

MINING OF AGGREGATE AS A SURFACE LAND USE

APPENDIX III

EXAMPLES OF AGGREGATE RESOURCE DATA AVAILABLE FOR THE RURAL MUNICIPALITY OF GLENWOOD

MINING OF AGGREGATE MINERALS AS A LAND USE

1.0 Introduction:

Pits and quarries represent a unique land use warranting special consideration in the preparation of any municipal development plan. This status may be attributed to the following inherent characteristics of surface mining:

i) The fullest possible utilization of local aggregate reserves is desirable since aggregrate deposits are non-renewable and essential aggregate is a commodity for virtually all construction activity.

ii) As both a land use and a user of land, open surface mines can create environmental conflicts affecting adjoining property. By its very nature surface mining can be a source of noise, dust, vibrations, vehicle (truck) traffic, steep embankments, dangerous open water conditions, and general visual degradation.

iii) Upon discontinuation of mining, rehabilitation and the development of alternative uses for the mine landscape must be considered. If the residual lands are simply abandoned in a derelict condition, they can become a source of nuisance (dust, weeds, garbage, etc.) and a long term safety concern. On the other hand, the large scale manipulation of the landscape to win aggregate deposits can present opportuniteis which enhance the potential for subsequent land uses. While it may be impossible to totally restore the pre-mining conditions of a site, it may be even more advantageous to exploit these new opportunities.

2.0 Mining Dispositions and Land Tenure

2.1 Responsibiliby for Rehabilitation:

The requirements of The Mines Act and any of its regulations are binding upon the owner of a mine operation, who initiates the mining and derives the main benefits of any returns. This may exclude the owner of surface rights, if he does not also hold the mineral rights. Although the mineral and surface rights are commonly held together, there are instances where they have been separated in previous transactions to facilitate mining. There are locations, for example, where the Crown holds one but not the other.

Manitoba Regulation 226/76, which sets out rehabilitation requirements, applies only to those pits and quarries which have been worked since January 1977. This authority is not binding for mines working out prior to this date.

2.2 Pits and Quarries on Crown Land vs. Private Land

Where the Crown owns the surface rights, the condition of the post mining landscape is of direct concern since the Crown is responsible for subsequent use of the site. Consequently, provincial agencies take an active role in directing mining and the preparation of rehabilitation plans for such mines.

The disposition of mining rights on Crown land may be handled in any of three ways:

i) A "Casual Permit" or a "Permission to Remove" may be obtained from the Mines Branch to remove a specific quantity of aggregate from a specific site.

ii) A "lease" may be obtained for a period of ten years (renewable) on lands open for staking.

On privately owned land, the advantages of developing a productive post mining land use are returned largely to the holder of surface property rights, in the form of both ongoing productivity and increased equity. Consequently, the main focus of concern for provincial authorities in these instances is to ensure that adjoining property will not be detrimentally affected by the mining activity, and that any hazards to the public are minimized.

In recognition of these characteristics, regulations have been enacted under The Mines Act since 1976 directed toward rehabilitation of all commerical quarries.* Rehabilitation may be broadly defined as the planned excavation and progressive reclamation of a mine site based on objectives of:

i) minimize detrimental impact on adjoining property

ii) protect the environment

iii) minimize hazards to public safety.

iv) leave the mining property in a condition which is or can be developed to serve some social or economic purpose compatible with adjoining land uses and with planning policies adopted under the authority of The Planning Act.

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*A commerical quarry as defined by Manitoba Regulation 226/76 means a pit or quarry from which more than 2,000 cubic yards of mineral are removed annually and which is operated for any purpose except for the personal use of an owner who is a natural person.

The provincial legislation imposes a common responsibility for rehabilitation of commercial pit and quarry operations throughout the province, and establishes minimum standards. The role of the municipality in exercising their authority under The Planning Act should be to direct the location of future mine development, and where necessary, establish controls above and beyond those currently acted. There will be situations where mining should not be allowed, or should be subject to site specific restrictions, in order to protect existing land uses. These issues cna best be addressed at the municipal level through zoning by-laws.

2.3 Mechanisms of Rehabilitation:

2.3.1 Mining Conditions:

Casual Permits and Permissions to Remove are issued subject to certain conditions which direct mining on the site and require appropriate rehabilitation. These conditions are based on strategies or rehabilitation plans prepared for each Crown pit or quarry subject to such applications.

2.3.2 Submission of Plans and Information:

In the case of lease holders, and commercial mines on private property, Manitoba Regulation 226/76 requires the submission of information concerning the proposed mine operation and rehabilitation. The scope of such submissions is outlined in the attached form. These plans are reviewed by the Mining Engineering and Inspection Section in general consultation with municipal officials and other government departments who provide expertise in various fields (i.e. groundwater, forestry, agriculture, highways, wildlife, etc.) or may assume responsibility for management of the post mining landscape.

2.3.3 Enforcement:

All mining activities in the Province are monitored by mines inspectors. Consultation with operators and the issue of 'orders' are means used to bring operations into compliance with The Mines

Act and its regulations. The legislation provides for fines to be imposed for any contravention. In addition, commercial mine operators are required to put up a bond which is held by the Crown pending completion of the rehabilitation requirements.

3.0 Criteria for Rehabilitation:

3.1 General Criteria:

The evaluation of rehabilitation plans and establishment of mining conditions is generally based on the following broad criteria:

i) any detrimental impact on the environment caused by the mine operation or the resultant mine landscape will be minimized to an acceptable level by controlling the extent and/or phasing of the operation and by implementing appropriate remedial measures.

ii) the operation of the mine and the reclamation of the landscape will mitigate any undue hazards to public safety.

iii) efficient use will be made of topsoil, overburden and reject material to facilitate progressive reclamation which will accommodate an appropriate end use.

3.2 Specific Considerations:

Within the context of such criteria, there are a wide range of specific concerns which will obviously vary from site to site. The following are a few of the major considerations:

i) Setback:

Many of the conflicts arising from surface mining can be minimized by providing a separation distance between mine excavation or stockpiles and the property boundary. Since such

restrictions may have the effect of tying up portions of a mineral deposit, this cost should be balanced against any benefits derived.

The Highways Protection Act imposes a setback of 125 feet from a department road, and 250 feet from a designated highway, subject to appeal. Regulations under The Mines Act specify a setback of 50 feet from other property boundaries, unless agreement is reached with the adjoining party. As a general minimum, a distance of 12 feet plus three times the height of an unconsolidated working face will provide sufficient room fr slope reclamation while minimizing the loss of material.

In local circumstances where a mineral deposit abuts existing development which is clearly sensitive to the characteristics of surface mining, the Municipality may establish setback controls substantially exceeding those under the Provincial regulation as a condition of allowing mining. The setback distances recommended on page 21 may be used where mining and residential land uses are juxtaposed.

ii) Environmental Protection:

The general criteria for protection of the environment have been established by Provincial statutes, regulations and guidelines, and are administered by various Provincial agencies. For example, the Water Rights Act regulates treatment of surface and groundwater, while emissions of noise, dust and vibration are regulated under The Clean Environment Act.

From the standpoint of surface mining, the main concern is to identify and resolve any problems before they occur, as part of a pre-planning stage. The impact of mining can be

substantially reduced where it is subject to requirements for additional setback, berms, tree screens and/or careful phasing of the operation followed by slope stabilization and revegetation. The effectiveness of such mechanisms should be evaluated carefully by a municipality before consideration is given to prohibiting mining a new locaton for environmental reasons. Mining is an interim land use, often of short duration. While it may be unacceptable in some circumstances, the interests of the municipality are best served by maximizing utilization of the available aggregate reserves.

iii) Public Safety:

The creation of steep slopes and new water bodies as a result of surface mining activity poses special problems of public safety. In pits, the unconsolidated material can be re-graded to a stable and traversable angle as a component of the rehabilitation program, thereby minimizing any safety hazard. However, the cost of grade modification in quarries is often prohibitive, due to difficulties in manipulating consolidated material and the inavailability of overburden. Under this circumstance, fences, berms and signage are tools used to inform persons of the dangerous conditions and prevent inadvertent access.

iv) End Land Use:

In some instances it will be impractical to return a mining site to its pre-mining condition, particularly in terms of biological productivity. However, it is in the public interest to promote productive use of the landscape, as opposed to accepting dereliction. There are opportunities to enhance environmental conditions for alternative uses as a by-product of the large scale manipulation of the mine site. The central concern here is that rehabilitated slopes on the mine site are

appropriate for the intended use, and that this intended use does not conflict with the development pattern established by the municipality.

Where a major mineral deposit is being worked, and it is expected that mining will continue for many years, designation of a specific post mining land use may be premature. In these circumstnaces interim rehabilitation should be directed toward optimizing the potential for the widest range of uses foreseeable. In time the options can be narrowed to facilitate more detailed site planning.

4.0 Municipal Concerns and Policy Recommendations:

Given the limitations of any controls established on a province-wide basis under The Mines Act, it is recommended that municipalities exercise their planning authority to properly accommodate mining as a land use in the local context. The following policy objectives are suggested for this purpose:

1. In any area where a mineral deposit is located adjacent to existing development which would clearly be sensitive to the impact of surface mining, the Municipality should, in consultation with the Mines Branch, enact controls limiting the extent of R.O.S. mining and establish appropriate conditions for operation beyond those required under The Mines Act and its regulations, which will have the effect of mitigating any undue environmental conflicts.

2. To minimize any future conflict between mineral resource exploitation and other land uses which would be sensitive to the inherent characteristics of surface mining, such sensitive land uses should not be allowed within 500 feet of the anticipated limits of mining activity. This would include but not be limited to seasonal or permanent residential uses, as well as certain institutional, commerical and recreational uses.

3. All local roads which now carry high volumes of truck traffic from a surface mine, or which may be anticipated to eventually carry high volumes of truck traffic upon commencement of mining a particular mineral deposit, should be protected from any adjoining development which would be sensitive to such traffic by:

   i) precluding development of any such land uses, or

   ii) establishing setback, screening, and ingress/egress controls which would mitigate the impact of high volumes of truck traffic.

4. The mining of aggregate is recognized as a transitional and interim land use. Consideration shold be given to pre-zoning a mine site for the sequential development of other activities which take advantage of opportunities inherent in the rehabilitated landscape, provided:

   i) the owner of the mine provides plans, schedules and information regarding the eventual condition of the mining site upon completion of excavaton and rehabilitation.

   ii) the owner of the mine demonstrates the appropriateness of such a use to the post-mining site and local conditions.

TABLE _____ SLOPE LIMITATIONS FOR LAND USE

Slope	Typical Uses
50% (2:1)	Can be climbed on foot, but is difficult to establish stabilizing vetegation.
30% (3:1)	Maximum slope traversed by tractor for seeding or mowing; expert ski slope; forestry; wildlife area.
20% (5:1)	Limit of economical agriculture activity, toboggan slope, beginners ski slope; maximum shore slope for easy wading.
15% (6.5:1)	Low density single family residential; golf course; maximum sustained slope for roads.
10% (10:1)	Single family developments (medium density) preferred maximum road slopes; limits of most commerical and industrial uses.
5% (20:1)	Preferred slope for most residential, commercial and industrial development; beaches/swimming shores.
1% (100:1)	Minimum slope to ensure positive surface drainage.

PROVINCE OF MANITOBA - AGGREGATE RESOURCES

EXPOSURE U0850 (010084 007 20W 01 SE) - VISITED 76/08

SAND AND GRAVEL PIT

1.0 M. MEDIUM LOW - QUALITY SHALEY SANDY PEBBLE GRAVEL 45% SHALE

SECTION A GEOLOGIST UM SECTION HEIGHT 1.7 M. EXAMINED 1.5 M. -

BASE SAND WATER TABLE .0 M. -

LITHOLOGY 45 % SHALES 19 % GENERAL CARBONATES

DELETERIOUS SHALE IRON OXIDE INCRUSTATIONS OR CONCRETIONS

SAMPLE-- COBBLES --- % PEBBLES --- % GRANULES --- % SAND --- % SILT/CLAY --- % -

PROVINCE OF MANITOBA - AGGREGATE RESOURCES

EXPOSURE U0851 (010087 007 21W 34 NE) - VISITED 76/09

SAND AND GRAVEL PIT

5.0 M. MEDIUM HIGH- QUALITY SANDY COARSE PEBBLE GRAVEL SOURIS AGATE PIT

SECTION A GEOLOGIST UM SECTION HEIGHT 5.0 M. EXAMINED 4.5 M. -

BASE WATER TABLE .0 M. -

LITHOLOGY 60 % OTHER SEDIMENTARY TYPES 13 % SHALES

DELETERIOUS SHALE IRON OXIDE INCRUSTATIONS OR CONCRETIONS

SAMPLE-- COBBLES --- % PEBBLES --- % GRANULES --- % SAND --- % SILT/CLAY --- % -

EXPOSURE U0851 (010087 007 21W 34 NE) VISITED 76/09

SAND AND GRAVEL PIT

5.0 M. MEDIUM HIGH- QUALITY SANDY COARSE PEBBLE GRAVEL SOURIS AGATE PIT

SECTION B GEOLOGIST CF SECTION HEIGHT 7.0 M. EXAMINED 5.0 M.

BASE GRAVEL WATER TABLE .0 M.

LITHOLOGY 60 % 15 % GENERAL PRECAMBRIANS

DELETERIOUS IRON OXIDE INCRUSTATIONS OR CONCRETIONS CHERT

SAMPLE-- COBBLES % PEBBLES 53.72 % GRANULES 12.16 % SAND 27.15 % SILT/CLAY 6.96 %

PROVINCE OF MANITOBA - AGGREGATE RESOURCES

DEPOSIT 010084 OUTWASH TERRACE

TOWN	RANGE	SECTION	QUARTER				
007	19W	06	SW	9,000	CU.M.		CU.M.DEPL/NOT AVAIL
	20W	01	SE	77,775	CU.M.	13725	CU.M.DEPL/NOT AVAIL

DEPOSIT RESERVES 86,775 CU.M.

PROVINCE OF MANITOBA - AGGREGATE RESOURCES

DEPOSIT 010086 OUTWASH TERRACE

TOWN	RANGE	SECTION	QUARTER			
007	21W	35	NE	6,000 CU.M.		CU.M.DEPL/NOT AVAIL
			NW	233,550 CU.M.	25950	CU.M.DEPL/NOT AVAIL
			SW	297,000 CU.M.		CU.M.DEPL/NOT AVAIL

DEPOSIT RESERVES 536,550 CU.M.

PROVINCE OF MANITOBA - AGGREGATE RESOURCES

DEPOSIT 010087 OUTWASH TERRACE

TOWN	RANGE	SECTION	QUARTER				
007	21W	34	NE	266,400	CU.M.	177600	CU.M.DEPL/NOT AVAIL
			NW	282,000	CU.M.		CU.M.DEPL/NOT AVAIL
			SE	381,600	CU.M.	254400	CU.M.DEPL/NOT AVAIL
			SW	24,000	CU.M.		CU.M.DEPL/NOT AVAIL

DEPOSIT RESERVES 954,000 CU.M.

PROVINCE OF MANITOBA - AGGREGATE RESOURCES

DEPOSIT 010088 OUTWASH TERRACE

TOWN	RANGE	SECTION	QUARTER			
007	21W	35	NW	242,250	CU.M.	42750 CU.M.DEPL/NOT AVAIL

DEPOSIT RESERVES 242,250 CU.M.

POLICY #13

ECONOMICALLY VALUABLE AGGREGATE AND QUARRY MINERAL DEPOSITS SHOULD BE PROTECTED FROM SURFACE LAND USES THAT WOULD INTERFERE WITH THEIR ONGOING AND FUTURE EXPLOITATION.

A. Policy Objectives

The objectives of this Policy are:

(a) To protect aggregate and quarry mineral resources for future construction and development in the Province.
(b) To ensure that materials are available to support local and provincial construction needs and industrial minerals production at a reasonable cost.
(c) To ensure that pit and quarry operations are reasonably compatible with adjacent land uses.
(d) To integrate aggregate and quarry mineral extraction into the overall land use planning process by allocating areas specifically for extraction and by assuming that as the economic climate changes so areas allocated to resource extraction will also change.
(e) To pursue sequential land use practices such that on a known deposit (i) a non-conflicting land use is applied to the surface of the deposit prior to mineral extraction, and (ii) the land is returned to a practical and compatible use once extraction has ceased.

B. Policy Application

Deposits of sand and gravel and near-surface limestone which are in demand as construction materials by industry, local communities or government departments and agencies, should be protected. In certain parts of the Province such minerals as bentonite, shale, gypsum, high calcium limestone, silica sand and other quarry minerals should also be protected to ensure a supply of these materials to industrial mineral related industries. These include both surface deposits and shallow subsurface deposits overlain by till or clay.

For the purpose of this Policy:

(a) Conflicting land uses include residential subdivision lots, highways or utility corridors. Such development should be deferred until the mineral is extracted and the site rehabilitated.
(b) Marginally conflicting land uses include the incorporation of aggregate and quarry mineral deposits into a Provincial or National Park, a Wildlife Management Area, a Community Pasture or a Provincial Forest or the establishment of a garbage dump on part of a deposit. In these cases, mineral extraction can take place alongside the alternative land use, provided that agreement is reached between the two concerns, to ensure optimal utilization of all resources involved.
(c) Non-conflicting land uses include recreation outside of Provincial Parks, low value timber stands, general agricultural practices and temporary occupation, such as trailer parks or parking lots. Pit and quarry operations can develop in these areas whenever such activities become economically feasible.

In some areas aggregate or quarry mineral extraction should be recognized as a primary land use. In other areas a marginal or non-conflicting land use may be permitted providing that it could later be converted to a gravel or mineral extraction operation.

In order to indicate areas where conflicting land uses should be disallowed, the Mineral Resources Division is in the process of producing aggregate and quarry mineral resource maps for certain regions of the Province. These will take the form of "Stop – Caution – Go" maps. "Stop" indicates valuable deposits upon which no conflicting land use should be allowed. "Caution" denotes a deposit whose full potential is not proven or whose quality is not high but which has been recognized as of value to the region. Deposits with a status of "Caution" may be designated for a conflicting land use, after local needs have been scrutinized. "Go" denotes a deposit of no present recognized value as an aggregate or quarry mineral source. Periodic revision to the "Stop – Caution – Go" status of deposits will reflect continuing exploration and changing economic

conditions. It is understood that the maps will be subject to approval by the Provincial Land Use Committee.

The rehabilitation of pits and quarries on both Crown and private land is governed by Regulation under The Mines Act. The rehabilitation takes place in accordance with an approved plan. Concensus for the plan is derived from concerned Municipal and Provincial agencies. The Mineral Resources Division requires such plans from all commercial operators.

Following mineral exploitation and rehabilitation, the land can be restored to some compatible use.

C. Definitions

For the purpose of this Policy:

(a) "Aggregate" means sand, gravel, or both, or crushed rock.

(b) "Economically Valuable Aggregate and Quarry Mineral Deposits" means those areas of aggregate and quarry mineral resource which have a high potential for extraction based on supply and demand projected over 25 years.

(c) "Quarry Minerals" means those minerals obtained by quarrying, including shale, kaolin, bentonite, gypsum, clay, silica-rich sand, peat, salt, coal, and rock or stone used for any purpose other than as a source of metal, asbestos, potash, oil and natural gas.

MUNICIPALITY OF WHITEHEAD

MUNICIPALITY OF OAKLAND

31 36 36

250 250

Interprovincial

Oil

Pipeline

CPR

PUMPING STATION

MONUMENT

NEWDALE HUTTERITE COLONY

V SCHOOL

Hayfield

348

HYDRO SUB-STATION

PUMPING STATION

HANGER

LIQUID FERTILIZER

Newstead

STABLES

SOURIS

HIGHWAYS

SEED CLEANING PLANT

VETERINARIAN

GOLF COURSE

010088

010086

010087

SOURIS RIVER

Schwitzer

Menteith

454

22

2

Creek

MUNICIPALITY OF WHITEHEAD

MUNICIPALITY OF OAKLAND

RECOMMENDED DEVELOPMENT STATUS OF SAND AND GRAVEL DEPOSITS IN THE SOURIS GLENWOOD PLANNING DISTRICT

LAND - USE

- STOP
- CAUTION
- GO

LEGEND

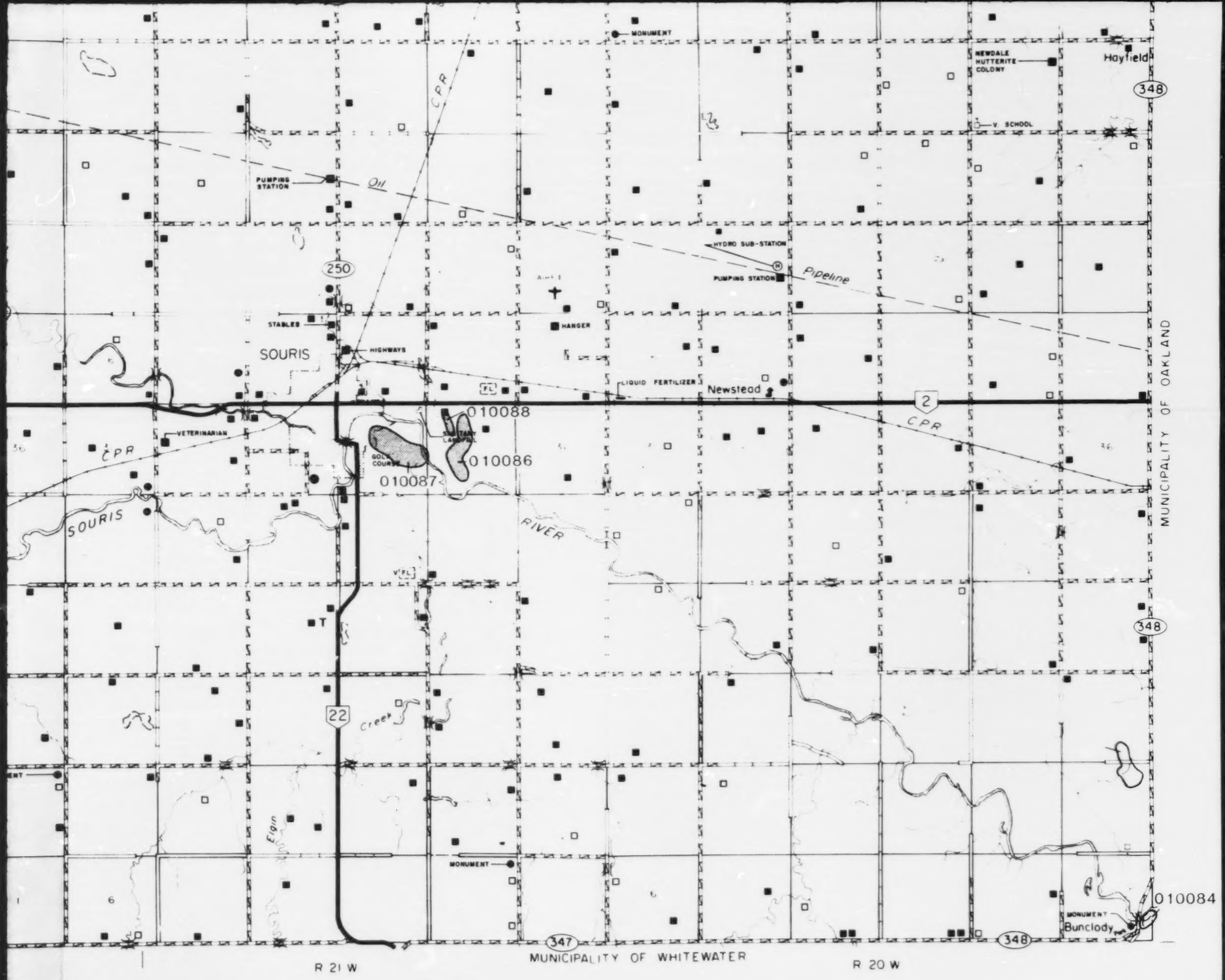
- Small Holding (non-farm)
- Farm Site
- Farm Site (vacant)
- T Mobile Home
- School Site (vacant)
- Golf Course
- Building As Described
- Grain Elevator
- (H) Hydro Sub-Station
- (FL) Feed Lot

Road Designations:

- Undeveloped Road Allowance Or Section Line
- Trail
- Improved Earth Road
- Gravel Road
- Pavement

NOTE: FIELDWORK DONE JUNE 1986

Interprovincial
Oil
Pipeline
CPR
Creek
Plum
SOURIS
RIVER
Elgin
Schwitzer
Menteith
Newstead
Hayfield
Bunclody
SOURIS
PUMPING STATION
HYDRO SUB-STATION
PUMPING STATION
MONUMENT
NEWDALE HUTTERITE COLONY
V. SCHOOL
STABLES
HIGHWAYS
HANGER
SEED CLEANING PLANT
LIQUID FERTILIZER
VETERINARIAN
SANITARY LANDFILL
GOLF COURSE
010088
010086
010087
MONUMENT
V. SCHOOL
GRAIN DRYERS
MONUMENT
MONUMENT
MONUMENT
2
250
348
454
22
347
348
347
348
6
31
36
1
MUNICIPALITY OF CAMERON
R 22 W
R 21 W
MUNICIPALITY OF WHITEWATER
R 20 W
MUNICIPALITY OF OAKLAND
0100



STOP

CAUTION

GO

LEGEND

- Small Holding (non-farm)
- Farm Site
- Farm Site (vacant)
- T Mobile Home
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NOTE: FIELDWORK DONE JUNE 1986.

1 0.5 0 1
Scale in Miles

Manitoba
Municipal Affairs
Municipal Planning

DATE JULY 1986	DRAWING NO. 131-61-102
REVISED	DRAWING NO.